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One World Trade Center
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EXAMINER

CHEN, WENPENG

ART UNIT	PAPER NUMBER
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2624

DATE MAILED: 06/08/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/849,502

Applicant(s)

LEE ET AL.

Examiner

Wenpeng Chen

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-29 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-29 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 03 May 2001 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 4.5.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: ____.

Drawings

1. Figure 1 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1, 5-8, 13, 15-16, 18-20, 22-26, and 28-29 are rejected under 35 U.S.C. 102(b) as being anticipated by Astle (US patent 6,026,190.)

For Claims 1 and 5-7, Astle teaches, in a computer system with a video encoder, a method for regulating level of a buffer storing compressed video information for the video encoder, the method comprising:

-- determining a level of a buffer for a video encoder, the buffer storing compressed video information; (Fig. 3; column 6, line 1-12)

-- based upon the determined level of the buffer, adjusting median filtering of video information; (Fig. 3; column 6, lines 27-32; column 10, lines 55-65)

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-- wherein the determining and the adjusting occur on a frame-by-frame basis for the video information; (column 12, lines 1-24)

-- wherein the video information includes a prediction residual; (column 5, lines 60-64; An inter-frame encoding includes a prediction residual.)

-- wherein the video information includes intra-coded pixel data. (column 5, lines 60-64; intra-frame encoding)

For Claim 8, Astle also teaches a computer readable medium storing instructions for causing a computer programmed thereby to perform the method of claim 1. (column 4, lines 32-50; host memory 126)

For Claims 13 and 15-16, Astle also teaches a computer readable medium storing instructions for causing a computer programmed thereby to perform a method of regulating lossy compression of video information in a video encoder, the method comprising:

-- during lossy compression of a set of video information, intermittently changing a kernel for filtering the set of video information, wherein the kernel defines a neighborhood of values for the filtering, the kernel selected from plural available kernels including at least a first kernel and a second kernel, the first kernel for decreasing quality and bitrate, and the second kernel for preserving quality and increasing bitrate, (a) wherein the changing is based upon a quality constraint for the set of video information, (b) wherein the changing is based upon a bitrate constraint for the set of video information; (Fig. 3; column 6, lines 27-32; column 10, lines 55-65; column 12, lines 18-40; column 11, lines 15; The filter tap ratio defines the kernel.)

-- using the kernel to filter the set of video information. (column 5, lines 60-64)

For Claims 18-20 and 22-23, Astle also teaches a computer readable medium (host memory 126) storing instructions for causing a computer programmed thereby to perform a method of controlling bitrate of information in an encoder, the method comprising:

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-- receiving a bitrate indicator for filtering a set of information, the received bitrate indicator indicating a bitrate goal for the set of information, the bitrate indicator based upon level of a buffer; (Fig. 3; column 6, line 1-12)

-- based upon the received bitrate indicator, adjusting kernel-based filtering of the set of information, wherein a kernel defines a neighborhood of values for the kernel-based filtering, wherein the filtering is median filtering, (a) wherein the adjusting comprises changing the kernel based upon the received bitrate indicator; (column 10, lines 55-65; Fig. 3; column 6, lines 27-32; column 12, lines 18-40; column 11, lines 15; The kernel has a 3x3 area. The strength S is adjusted. The filter tap ratio defines the kernel)

-- wherein the set of information includes a prediction residual; (column 5, lines 60-64; An inter-frame encoding includes a prediction residual.)

-- wherein the set of information is for a video sequence, and wherein the receiving and the adjusting occur for each new set of information for the video sequence. (column 12, lines 1-24)

For Claim 24-26 and 28-29, Astle also teaches, in a computer system, an encoder with a bitrate adaptive filter for filtering information, the encoder comprising:

-- a bitrate adaptive filter for filtering information, wherein the bitrate adaptive filter is a bitrate adaptive median filter; (Fig. 3; column 6, lines 27-32; column 10, lines 55-65)

-- a frequency transformer for transforming filtered information into the frequency domain; (column 5, lines 45-64; DCT)

-- a quantizer for quantizing frequency transformed information, wherein the quantizer is a bitrate adaptive quantizer; (column 5, line 45 to column 6, line 12)

-- an entropy coder for entropy coding quantized information; (column 5, lines 45-64; run-length coding)

-- a buffer for buffering entropy coded information, wherein the bitrate adaptive filter adjusts filtering in relation to level of the buffer; (Fig. 3; column 6, lines 1-12, 27-32; column 10, lines 55-65)

-- wherein a kernel defines a neighborhood of values for the bitrate adaptive filter, and wherein the bitrate adaptive filter adjusts filtering by changing the kernel based upon the level of the buffer; (Fig. 3; column 6, lines 27-32; column 10, lines 55-65; column 12, lines 18-40; column 11, lines 15; The filter tap ratio defines the kernel.)

-- wherein the video information includes intra-coded pixel data and a prediction residual. (column 5, lines 60-64; column 5, lines 60-64; intra-frame encoding; An inter-frame encoding includes a prediction residual.)

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 2-3, 9, 11-12, and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Astle (US patent 6,026,190) in view of Russ ("The Image Processing Handbook," 2nd edition, CRC Press, 1994, pages 164-166.)

For Claims 2-3, Astle as discussed above teaches the parental Claim 1. Although Astle teaches "changing the strength of median filtering based upon the determined level of the

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buffer", it does not teach the feature related to "changing the kernel of median filtering based upon the determined level of the buffer."

Russ teaches median filters with various kernel size and shape (Fig. 11., page 165.) As shown in Fig. 10, page 164 of Russ, the strength of filter (c) having 21 pixels of Fig. 11 is larger than that of filter (b) having 9 pixels of Fig. 11, because Fig. 10(d) corresponding to filter (c) had less noise dots than Fig. 10(c) corresponding to filter (b). Of course, both noises of Figs. 10(c) and 10(d) are smaller than that of Fig. 10(b) which corresponds to case without any filtering.

It is desirable to have flexibility to select various ways for adjusting the strength of median filters. It would have been obvious to one of ordinary skill in the art, at the time of the invention, to add Russ's approach to include "changing the kernel of median filtering" as a way for changing the strength of median filtering in Astle's method, because the combination provides flexibility in bit rate control.

Because the five median filters of Fig. 11 of Russ are discrete, it would have been obvious to one of ordinary skill in the art, at the time of the invention that each filter represents a discrete range of strength of filtering. Once the strength of filtering for bit rate control is determined in Astle, the type of filter (or no filtering) will be selected from Fig. 11 of Russ. Therefore, the combination teaches:

-- wherein a kernel defines a neighborhood of values for the median filtering, and wherein the adjusting comprises changing the kernel based upon the determined level of the buffer;

-- wherein the changing comprises: if the determined level is within a first range, selecting a first kernel; and if the determined level is within a second range, selecting a second kernel.

The teachings of Astle and Russ as discussed above evidently teach all features recited in Claims 9 and 11-12.

For Claim 14, Astle as discussed above teaches the parental Claim 13. Also as discussed above, Astle uses averaging filters of various kernels. For flexibility, averaging filters can be replaced with various median filters in view of the combined teachings of Astle and Russ.

6. Claim 27 is rejected under 35 U.S.C. 103(a) as being unpatentable over the admitted prior art (pages 2-3) in view of Astle (US patent 6,026,190.)

The admitted prior art teaches an encoder for bit rate control wherein the information is for plural frames of a video sequence, and wherein the encoder drops information for one or more of the plural frames when the buffer approaches fullness. (page 2, line 16 to page 3, line 2)

However, the admitted prior art does not teach the features of the parent Claim 26 of Claim 27.

As discussed above, Astle teaches all the features recited for Claim 26.

It is desirable to maintain quality of a video as much as possible. One way to achieve this object is to minimize the number of dropped frames. With the bit rate control based on adaptive filtering, there is less chance the buffer will be full. As a consequence, there will be less frames to be dropped. It would have been obvious to one of ordinary skill in the art, at the time of the invention, to apply Astle's bit rate control to the encoder of the admitted prior art to further control the generated bits, because the combination maintains better quality of a video.

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7. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over the admitted prior art (pages 2-3) in view of Astle (US patent 6,026,190) and Russ ("The Image Processing Handbook," 2nd edition, CRC Press, 1994, pages 164-166.)

The admitted prior art teaches an encoder for bit rate control wherein the information is for plural frames of a video sequence, and wherein the encoder drops information for one or more of the plural frames when the buffer approaches fullness. (page 2, line 16 to page 3, line 2)

However, the admitted prior art does not teach the features of the parent Claim 9 of Claim 10.

As discussed above, the combination of Astle and Russ teaches all the features recited for Claim 9.

It is desirable to maintain quality of a video as much as possible. One way to achieve this object is to minimize the number of dropped frames. With the bit rate control based on adaptive filtering, there is less chance the buffer will be full. As a consequence, there will be less frames to be dropped. It would have been obvious to one of ordinary skill in the art, at the time of the invention, to apply bit rate control taught by Astle and Russ to the encoder of the admitted prior art to further control the generated bits, because the overall combination maintains better quality of a video.

8. Claims 4 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Astle (US patent 6,026,190) in view of Fukuda (US patent 5,625,714.)

Astle as discussed above teaches the parental Claims 1 and 18. Although Astle teaches "changing the strength of median filtering based upon the determined level of the buffer", it does

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not teach the feature related to " the adjusting comprises changing a number of times for the median filtering of the video information."

Fukuda teaches "adjusting the strength of an overall median filtering with changing a number of times for small-size median filtering." (column 18, lines 1-21)

It is desirable to have flexibility to select various ways for adjusting the strength of median filters. It would have been obvious to one of ordinary skill in the art, at the time of the invention, to add Fukuda's approach to change times of small-size median filtering as a way for changing the strength of an overall median filtering of Astle's method, because the combination provides flexibility in bit rate control.

9. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Astle (US patent 6,026,190) in view of Sun et al. (US patent 5,969,764.)

Astle as discussed above teaches the parental Claim 13. However, it does not teach the feature related to video object.

Sun teaches coding video objects. (column 4, lines 24-51; VO)

It is desirable to extend rate control to various kinds of image compression. It would have been obvious to one of ordinary skill in the art, at the time of the invention, to apply Astle's bit rate control approach to control bit rate of coding video objects taught by Sun, because the combination extend Astle's application to compression using video objects. The advantages of using Astle's approach are discussed in columns 1-2 of Astle.

Conclusion

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10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Wenpeng Chen whose telephone number is 703 306-2796. The examiner can normally be reached on 8:30 am - 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David K Moore can be reached on 703 308-7452. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9306 for regular communications and 703-872-9306 for After Final communications. TC 2600's customer service number is 703-306-0377.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703 305-4700.

Wenpeng Chen
Primary Examiner
Art Unit 2624

May 27, 2004

